The University of Texas at Tyler
Department of Electrical and Computer Engineering

CMPE 3301: Foundations of Computer Engineering

Syllabus

Course Description:	Foundational topics in Computer Engineering: Circuit design using Computer Aided Design (CAD) tools; Printed Circuit Boards (PCB) Basics: Schematics, Board Layout, Verification, Bus; Single Board Computer: Command line programming, Linux fundamentals, Virtual Machines, Networking Basics, Web design; Introduction to 3D printing. Three hours of lecture each week.
Course credit:	3 hours
Prerequisites	COSC 2336 Data Structures and Algorithms, MATH 2413 Calculus I **Pre- or Co-requisites:** EENG 3302 Digital Systems Design, EENG 3306 Electronic Circuits Analysis I
Class Meeting Days and Location:	Ctr C204 9:30 – 10:50 AM Tue/Tur
Instructor(s):	**Course coordinator**
	Dr. Fatemeh Kalantari, Electrical Engineering, Office: A205 Email: Fkalantari@uttyler.edu Website:https://www.uttyler.edu/directory/electrical-engineering/kalantari.php Office Hours: M 2-4 PM, or Zoom MW 10 AM-12 Preferred Method of contact: email
Required Materials	Study material provided by instructor, Autodesk Fusion360, EAGLE PCB design software, Raspberry Pi board.
Recommended Materials:	Cadence
Course Student Learning Objectives (SLOs)	1. Analyze the design flow for circuit modeling using CAD tools. 2. Design circuit schematics using Eagle software. 3. Analyze the errors in board layouts using DRC and ERC checks. 4. Create Gerber files for the printed circuit boards 5. Configure a single board computer using Command line interface (CLI) programming. 6. Analyze the steps involved in automation using Linux scripting. 7. Design and implement web/user interface for data analytics. 8. Configure virtual machines using single board computers. 9. Analyze the steps involved in 3D modeling and printing using Fusion360.

	WEEK	TOPICS COVERED	
Course Schedule/Content	1	Introduction to Computer Aided Design (CAD)	
	2	Design flow for circuit modeling, PCB and 3D modeling	
	3	Circuit schematics using CAD (Eagle and TinkerCAD)	
	4	PCB design using Eagle	
	5	Example circuits and PCBs.	
	6	Testing and verification of PCB design	
	7	Intro to Single Board Computers and Microcontrollers	
	8	Raspberry Pi setup using CLI.	
	9	Linux scripting	

	10	Linux scripting - Administration	
	11	Virtual Machine setup	
	12	Automation using Linux scripting	
	13	Web/user interface design	
	14	3D Modeling using Fusion 360	
	15	**FINAL EXAM**	

Class Withdrawal	The withdrawal policy outlined by the Registrar will be strictly followed. The policy may be found at the following website: http://www.uttyler.edu/registrar/registration/withdrawals.php The last day to withdraw from courses is listed in the Academic Calendar.
Grading Policy and Criteria to Determine Final Grade	Homework and project reports will be due in Canvas one week after assignment. Project reports should be written as per the guidelines provided. A 25% penalty will be assessed for missing the submission deadline and an additional 25% penalty will apply per week for late project reports and homework. Any deviation from this rule will be at the sole discretion of the instructor. All submissions are required to be in Microsoft Word format with machine readable text and not images or other representations of text. This rule will be applied to all sections of the report including the appendices and program code with comments. All flowcharts and diagrams must be prepared using Microsoft Office and not by hand. Any attempts to defeat the plagiarism checking software by submission of documents that include images instead of body text or any other mechanism will result in a grade of zero. The instructor or responsible grader reserves all rights to make this judgement and reject a project report if the above rules are not followed. Any violations may result in ACADEMIC DISHONESTY charges to be filed against the student. Student waives all rights to a make-up exam if they miss a scheduled testing date. Any make-up testing will be at the sole discretion of the instructor. Students should be aware that absolute academic integrity is expected of every student in all undertakings at The University of Texas at Tyler. Failure to comply can result in strong university-imposed penalties. All lab reports and assignments will be verified using plagiarism checking software and violations will result in a grade of zero for the lab report or assignment at a minimum, and possibly stronger penalties such as a failing grade in the course and a scholastic dishonesty report submitted to the university.
	Grades will be assigned based on the total score as per the distribution below and the following scale out of a 100 total: A: >90, B: >80, C: >70, D: >60, F: <60 Any deviation from the above policy such as scaling or curving to calculate the individual item or final scores will be at the sole discretion of the instructor and performed by the instructor uniformly for all students in the class section.

Examination and/or Major Assessment Policies and Procedures	Participation / Quizzes	10%
	Assignments	10%
	Project	30%
	Mini Projects	20%
	Final Exam	30%

Attendance and Make-up Policy	The progressive nature of the class means that perfect attendance is recommended if a good grade is desired. Makeup quizzes, exams or projects will only be provided for valid absences and at the sole discretion of the instructor.
Computer Equipment Policy	In order to take this class, integrated laboratory sessions and quizzes/exams, you will need the following items as specified below: • Windows 10 Computer or Mac running Windows virtualization software • High-speed Internet connection • Webcam (internal or external) • NI Multisim software

Type	Minimum	Recommended
Web Camera	640×480 resolution	1280×720 resolution
PC Users	Windows Vista	Windows 10 (10 S is not supported)
Mac Users	OS X 10.5 or higher	OS X 10.13 High Sierra
Internet Download Speed	.768 Mbps	1.5 Mbps
Internet Upload Speed	.384 Mbps	1 Mbps
RAM	1024 MB	2 GB
Ports	1935, 843, 80, 443, 61613, UDP/TCP	1935, 843, 80, 443, 61613, UDP/TCP

Proctoring	The assessments in this online course will be proctored using ProctorU or two-way interactive Zoom sessions. Beyond the cost of initial equipment needed (e.g. a camera for your computer), there will not be any additional cost for proctoring. You will need to create a ProctorU account and install the ProctorU extension before attempting any assessment. To create a ProctorU account, follow the ProctorU tool within Canvas. Please make sure you are using the current version of Chrome or Firefox and download the ProctorU extension available at http://bit.ly/proctoruchrome or https://www.proctoru.com/firefox. In order to use ProctorU, you will need the following: • High-speed Internet connection • Webcam (internal or external) • Windows, Mac, or Chrome Operating System • Up-to-date Chrome or Firefox browser and ProctorU extension installed • Valid photo ID • Quiet environment to take your assessment You can visit the Test Taker Resource Page for additional information at https://bit.ly/ProctorMe
UT Tyler Honor Code	Every member of the UT Tyler community joins together to embrace: Honor and integrity that will not allow me to lie, cheat, or steal, nor to accept the actions of those who do.
Students' Rights and Responsibilities	To know and understand the policies that affect your rights and responsibilities as a student at UT Tyler, please follow this link: http://www.uttyler.edu/wellness/rightsresponsibilities.php. Students are responsible for reviewing the syllabus and abiding by all that is within. Students are encouraged to seek clarification within the first week of the course.
Campus Carry	We respect the right and privacy of students 21 and over who are duly licensed to carry concealed weapons in this class. License holders are expected to behave responsibly and keep a handgun secure and concealed. More information is available at http://www.uttyler.edu/about/campus-carry/index.php

UT Tyler a Tobacco-Free University	All forms of tobacco will not be permitted on the UT Tyler main campus, branch campuses, and any property owned by UT Tyler. This applies to all members of the University community, including students, faculty, staff, University affiliates, contractors, and visitors. Forms of tobacco not permitted include cigarettes, cigars, pipes, water pipes (hookah), bidis, kreteks, electronic cigarettes, smokeless tobacco, snuff, chewing tobacco, and all other tobacco products. There are several cessation programs available to students looking to quit smoking, including counseling, quitlines, and group support. For more information on cessation programs please visit www.uttyler.edu/tobacco-free.
Grade Replacement/ Forgiveness and Census Date Policies	Students repeating a course for grade forgiveness (grade replacement) must file a Grade Replacement Contract with the Enrollment Services Center (ADM 230) on or before the Census Date of the semester in which the course will be repeated. Grade Replacement Contracts are available in the Enrollment Services Center or at http://www.uttyler.edu/registrar. Each semester's Census Date can be found on the Contract itself, on the Academic Calendar, or in the information pamphlets published each semester by the Office of the Registrar. Failure to file a Grade Replacement Contract will result in both the original and repeated grade being used to calculate your overall grade point average. Undergraduates are eligible to exercise grade replacement for only three course repeats during their career at UT Tyler; graduates are eligible for two grade replacements. Full policy details are printed on each Grade Replacement Contract. The Census Date is the deadline for many forms and enrollment actions of which students need to be aware. These include: • Submitting Grade Replacement Contracts, Transient Forms, requests to withhold directory information, approvals for taking courses as Audit, Pass/Fail or Credit/No Credit. • Receiving 100% refunds for partial withdrawals. (There is no refund for these after the Census Date) • Schedule adjustments (section changes, adding a new class, dropping without a "W" grade) • Being reinstated or re-enrolled in classes after being dropped for non-payment • Completing the process for tuition exemptions or waivers through Financial Aid
State-Mandated Course Drop Policy	Texas law prohibits a student who began college for the first time in Fall 2007 or thereafter from dropping more than six courses during their entire undergraduate career. This includes courses dropped at another 2-year or 4-year Texas public college or university. For purposes of this rule, a dropped course is any course that is dropped after the census date (See Academic Calendar for the specific date). Exceptions to the 6-drop rule may be found in the catalog. Petitions for exemptions must be submitted to the Enrollment Services Center and must be accompanied by documentation of the extenuating circumstance. Please contact the Enrollment Services Center if you have any questions.
Student Accessibility and Resources	In accordance with Section 504 of the Rehabilitation Act, Americans with Disabilities Act (ADA) and the ADA Amendments Act (ADAAA) the University of Texas at Tyler offers accommodations to students with learning, physical and/or psychological disabilities. If you have a disability, including a non-visible diagnosis such as a learning disorder, chronic illness, TBI, PTSD, ADHD, or you have a history of modifications or accommodations in a previous educational environment, you are encouraged to visit

	https://hood.accessiblelearning.com/UTTyler and fill out the New Student application. The Student Accessibility and Resources (SAR) office will contact you when your application has been submitted and an appointment with Cynthia Lowery, Assistant Director of Student Services/ADA Coordinator. For more information, including filling out an application for services, please visit the SAR webpage at http://www.uttyler.edu/disabilityservices, the SAR office located in the University Center, # 3150 or call 903.566.7079.
Student Absence due to Religious Observance	Students who anticipate being absent from class due to a religious observance are requested to inform the instructor of such absences by the second class meeting of the semester.
Student Absence for University-Sponsored Events and Activities	If you intend to be absent for a university-sponsored event or activity, you (or the event sponsor) must notify the instructor at least two weeks prior to the date of the planned absence. At that time the instructor will set a date and time when make-up assignments will be completed.
Social Security and FERPA Statement	It is the policy of The University of Texas at Tyler to protect the confidential nature of social security numbers. The University has changed its computer programming so that all students have an identification number. The electronic transmission of grades (e.g., via e-mail) risks violation of the Family Educational Rights and Privacy Act; grades will not be transmitted electronically.
Emergency Exits and Evacuation	Everyone is required to exit the building when a fire alarm goes off. Follow your instructor's directions regarding the appropriate exit. If you require assistance during an evacuation, inform your instructor in the first week of class. Do not re-enter the building unless given permission by University Police, Fire department, or Fire Prevention Services.
Student Standards of Academic Conduct	Disciplinary proceedings may be initiated against any student who engages in scholastic dishonesty, including, but not limited to, cheating, plagiarism, collusion, the submission for credit of any work or materials that are attributable in whole or in part to another person, taking an examination for another person, any act designed to give unfair advantage to a student or the attempt to commit such acts. i. "Cheating" includes, but is not limited to: • copying from another student's test paper; • using, during a test, materials not authorized by the person giving the test; • failure to comply with instructions given by the person administering the test; • possession during a test of materials which are not authorized by the person giving the test, such as class notes or specifically designed "crib notes". The presence of textbooks constitutes a violation if they have been specifically prohibited by the person administering the test; • using, buying, stealing, transporting, or soliciting in whole or part the contents of an unadministered test, test key, homework solution, or computer program; • collaborating with or seeking aid from another student during a test or other assignment without authority; • discussing the contents of an examination with another student who will take the examination;

	- divulging the contents of an examination, for the purpose of preserving questions for use by another, when the instructors has designated that the examination is not to be removed from the examination room or not to be returned or to be kept by the student; - substituting for another person, or permitting another person to substitute for oneself to take a course, a test, or any course-related assignment; - paying or offering money or other valuable thing to, or coercing another person to obtain an unadministered test, test key, homework solution, or computer program or information about an unadministered test, test key, home solution or computer program; - falsifying research data, laboratory reports, and/or other academic work offered for credit; - taking, keeping, misplacing, or damaging the property of The University of Texas at Tyler, or of another, if the student knows or reasonably should know that an unfair academic advantage would be gained by such conduct; and - misrepresenting facts, including providing false grades or resumes, for the purpose of obtaining an academic or financial benefit or injuring another student academically or financially. <ol start="2" type="i"> "Plagiarism" includes, but is not limited to, the appropriation, buying, receiving as a gift, or obtaining by any means another's work and the submission of it as one's own academic work offered for credit. "Collusion" includes, but is not limited to, the unauthorized collaboration with another person in preparing academic assignments offered for credit or collaboration with another person to commit a violation of any section of the rules on scholastic dishonesty. - All written work that is submitted will be subject to review by Unicheck™, available on Canvas
UT Tyler Resources for Students	- UT Tyler Writing Center (903.565.5995), writingcenter@uttyler.edu - UT Tyler Tutoring Center (903.565.5964), tutoring@uttyler.edu - The Mathematics Learning Center, RBN 4021, this is the open access computer lab for math students, with tutors on duty to assist students who are enrolled in early-career courses. - UT Tyler Counseling Center (903.566.7254)
Artificial Intelligence Statement	UT Tyler is committed to exploring and using artificial intelligence (AI) tools as appropriate for the discipline and task undertaken. We encourage discussing AI tools' ethical, societal, philosophical, and disciplinary implications. All uses of AI should be acknowledged as this aligns with our commitment to honor and integrity, as noted in UT Tyler's Honor Code. Faculty and students must not use protected information, data, or copyrighted materials when using any AI tool. Additionally, users should be aware that AI tools rely on predictive models to generate content that may appear correct but is sometimes shown to be incomplete, inaccurate, taken without attribution from other sources, and/or biased. Consequently, an AI tool should not be considered a substitute for traditional approaches to research. You are ultimately responsible for the quality and content of the information you submit. Misusing AI tools that violate the guidelines specified for this course is considered a breach of academic integrity. The student will be subject to disciplinary actions as outlined in UT Tyler's Academic Integrity Policy.

	For this course, **AI is not permitted in this course at all.** I expect all work students submit for this course to be their own. I have carefully designed all assignments and class activities to support your learning. Doing your own work, without human or artificial intelligence assistance, is best for your efforts in mastering course learning objectives. For this course, I expressly forbid using ChatGPT or any other artificial intelligence (AI) tools for any stages of the work process, including brainstorming. Deviations from these guidelines will be considered a violation of UT Tyler's Honor Code and academic honesty values.
	The work submitted by students in this course will be generated by themselves. This includes all process work, drafts, brainstorming artifacts, editing, and final products. This extends to group assignments where students must create collaboratively create the project. Any instance of the following constitutes a violation of UT Tyler's Honor Code: a student has another person/entity do any portion of a graded assignment, which includes purchasing work from a company, hiring a person or company to complete an assignment or exam, using a previously submitted assignment and/or using AI tools (such as ChatGPT).
Recording of Class Sessions	Class sessions may be recorded by the instructor for use by students enrolled in this course. Recordings that contain personally identifiable information or other information subject to FERPA shall not be shared with individuals not enrolled in this course unless appropriate consent is obtained from all relevant students. Class recordings are reserved only for the use of students enrolled in the course and only for educational purposes. Course recordings should not be shared outside of the course in any form without express permission.
Absence for Pregnant Students	This course follows the requirements of Texas Laws SB 412, SB 459, SB 597/HB 1361 to meet the needs of pregnant and parenting students. Part of the supports afforded pregnant students includes excused absences. Faculty who are informed by a student of needing this support should make a referral to the Parenting Student Liaison. NOTE: Students must work with the Parenting Student Liaison in order to receive these supports. Students should reach out to the Parenting Student Liaison at parents@uttyler.edu and also complete the Pregnant and Parenting Self-Reporting Form.

The University of Texas at Tyler
Department of Electrical and Computer Engineering

CMPE 3301: Foundations of Computer Engineering (Required)

Outline

Catalog Description:

Foundational topics in Computer Engineering: Circuit design using Computer Aided Design (CAD) tools; Printed Circuit Boards (PCB) Basics: Schematics, Board Layout, Verification, Bus; Single Board Computer: Command line programming, Linux fundamentals, Virtual Machines, Networking Basics, Web design; Introduction to 3D printing. Three hours of lecture each week.

Prerequisites: COSC 2336 Data Structures and Algorithms, Pre- or Co-requisites: EENG 3302 Digital Systems Design, EENG 3306 Electronic Circuits Analysis I

Credits: (3 hours lecture, 0 hours laboratory per week)

Text(s): Study material provided by instructor, Autodesk Fusion360, EAGLE PCB design software, Raspberry Pi board.

Additional Material: TBD

Course Coordinator: Fatemeh Kalantari, Assistant Professor, Electrical Engineering

Topics Covered: (paragraph of topics separated by semicolons)

Introduction to Computer Aided Design (CAD); Design flow for circuit modeling, PCB and 3D modeling; Circuit schematics using CAD (Eagle and TinkerCAD); PCB design using Eagle; Example circuits and PCBs.; Testing and verification of PCB design; Intro to Single Board Computers and Microcontrollers; Raspberry Pi setup using CLI.; Linux scripting; Linux scripting – Administration; Virtual Machine setup; Automation using Linux scripting; Web/user interface design; 3D Modeling using Fusion 360

Evaluation Methods: (only items in dark print apply):
1. Examinations / Quizzes
2. Homework
3. Report
4. Computer Programming
5. Project
6. Presentation
7. Course Participation
8. Peer Review

Course Learning Outcomes[1]: By the end of this course students will be able to:
1. Analyze the design flow for circuit modeling using CAD tools. [1, 3, 5]
2. Design circuit schematics using Eagle software. [3, 5]
3. Analyze the errors in board layouts using DRC and ERC checks. [1, 3, 5]
4. Create Gerber files for the printed circuit boards. [3, 5]
5. Configure a single board computer using Command line interface (CLI) programming. [4, 5]
6. Analyze the steps involved in automation using Linux scripting. [1, 4, 5]
7. Design and implement web/user interface for data analytics. [3, 4, 5]
8. Configure virtual machines using single board computers. [3, 5]
9. Analyze the steps involved in 3D modeling and printing using Fusion360. [3, 5]

[1]Numbers in brackets refer to method(s) used to evaluate the course objective.

Relationship to Student Outcomes (only items in dark print apply)[2]: This course supports the following Electrical Engineering Student Outcomes, which state that our students will possess:
1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics [3]

2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors. [2, 7]
3. an ability to communicate effectively with a range of audiences. [1]
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives. [8]
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions [4, 6]
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies. [5, 9]

²Numbers in brackets refer to course objective(s) that address the Student Outcome.

Contribution to Meeting Professional Component: (in semester hours)

Mathematics and Basic Sciences:		hours
Engineering Sciences and Design:	3	hours
General Education Component:		hours

Prepared By:	Prabha Sundaravadivel	Date:	4 January 2023
Updated By:	Fatemeh Kalantari	Date:	18 August 2024

Updated By:		Date:	